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LABORATORY ITEM 465

MC309005054 *log*

A SUMMARY OF SEDIMENT SIZE, CHEMISTRY, AND PHYSICAL PROPERTIES  
OF TWO CORES FROM NEW ORLEANS. NAVY DIVERS. JUNE 1973.

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Prepared for: Code 6110

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Geological Laboratory  
Nearshore Surveys Division  
Oceanographic Surveys Department

NAVAL OCEANOGRAPHIC OFFICE  
WASHINGTON, D.C. 20373

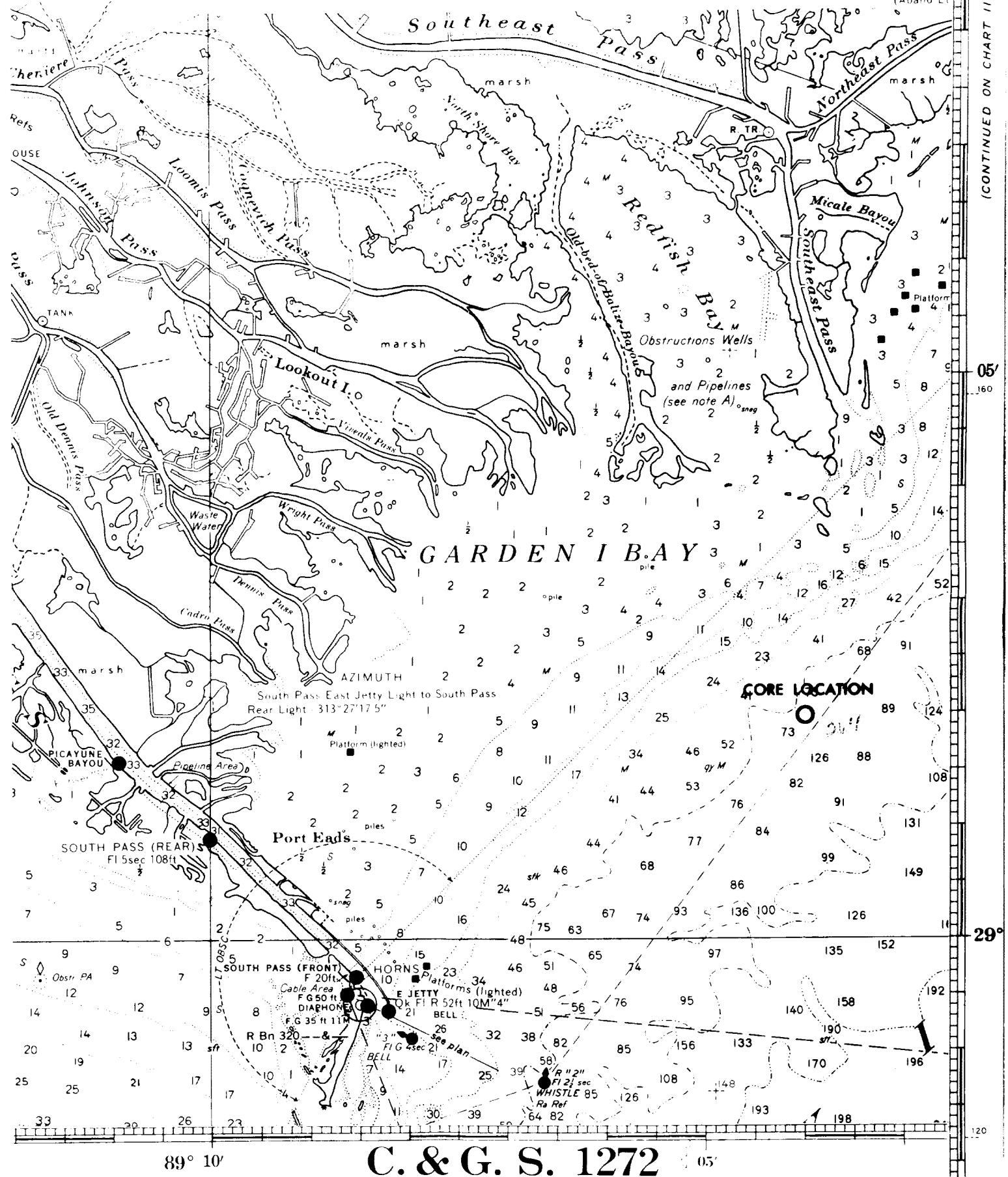
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# MISSISSIPPI RIVER DELTA

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(CONTINUED ON CHART 115)



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EXPLANATION OF DATA PAGES  
CORE ANALYSIS SUMMARY SHEET  
Engineering Properties  
NAVOCEANO (EXP) 3167/18B (Rev. 1-63)

Results of engineering properties, core analysis performed by the U. S. Naval Oceanographic Office Geological Laboratory are recorded on Core Analysis Summary Sheet Engineering Properties.

The following is a description of the terms employed on the Core Analysis Summary Sheet:

1. Cruise Number. A number assigned to each cruise for identification purposes.
2. Latitude. Expressed in degrees, minutes, and seconds.
3. Longitude. Expressed in degrees, minutes, and seconds.
4. Sample Number. A consecutive number, commencing with 1, applied to each core taken successively throughout the cruise.
5. Date Taken. Day (GMT), month, and year.
6. Water Depth (m). The uncorrected sonic sounding recorded in meters.
7. Type Corer. Identified by the name of device employed.
8. Core Length(cm). Recorded in centimeters as observed in the laboratory.
9. Core Penetration (cm). Recorded in centimeters as observed in the field.
10. Subsample Depth in Core (cm). Interval of subsample as measured in centimeters from the top of the core.
11. Wet Unit Weight (g/cm<sup>3</sup>). The weight (solids plus water) per unit volume of the sediment mass.
12. Specific Gravity of Solids. The ratio of weight in air of a given volume of a sediment at 20°C to the weight in air of an equal volume of distilled water at 20°C.
13. Water Content (% dry weight). The ratio, in percent, of the weight of water in a given mass of the sediment sample to the weight of the solid particles.

14. Void Ratio. The ratio of the volume of void spaces to the volume of solid particles in the sediment sample as computed from Wet Unit Weight, Specific Gravity of Solids, and Water Content.

15. Saturated Void Ratio. The Void Ratio at 100 percent saturation as computed from Water Content and Specific Gravity of Solids.

$$\text{Saturated Void Ratio} = \frac{\text{Water Content} \times \text{Specific Gravity of Solids}}{100}$$

16. Porosity (%). The ratio, usually expressed as a percentage, of the volume of voids of a sediment mass to the total volume of the sediment mass.

17. Liquid Limit. Water Content, in percent, at which a pat of sediment cut by a groove of standard dimension will flow together for a distance of 1/2 inch under the impact of 25 blows in a standard liquid limit apparatus.

18. Plastic Limit. Water Content, in percent, at which a sediment will just begin to crumble when rolled into a thread approximately 1/8 inch in diameter.

19. Plasticity Index. The numerical difference between the Liquid Limit and Plastic Limit of the sediment mass.

20. Liquidity Index. The ratio, expressed in percentage, of (1) the natural water content of the sediment sample minus its Plastic Limit to (2) its Plasticity Index.

21. Compression Index. The slope of the linear portion of the Pressure-Void Ratio curve on a semi-log plot.

22. Compressive Strength. The load per unit area required to shear an unconfined, natural or remolded, sediment mass.

23. Cohesion. The shearing strength per unit area under zero externally applied load.

24. Sensitivity. The ratio of the natural to the remolded strength. It is a measure of the loss of strength due to remolding the sediment mass.

25. Angle of Internal Friction ( $^{\circ}$ ). The angle between the abscissa and the tangent of the curve representing the relationship of "shearing resistance" to "normal stress" acting within a sediment mass.

26. Activity. The ratio of the Plasticity Index to the clay fraction percentage (<.002 mm) of the sediment mass.

27. Modulus of Elasticity. The ratio of stress to strain of the sediment mass.

28. Slump (%). The ratio, in percent, of the amount of height change immediately before the compressive strength test to the original height of a cylinder of sediment.

## EXPLANATION OF COMPUTER DATA SHEET SEDIMENT SIZE AND COMPOSITION

Results of sediment-size and -composition core analysis performed by the U. S. Naval Oceanographic Office Geological Laboratory are tabulated on Computer Data Sheet Sediment Size and Composition.

The following is an explanation of the terms employed on the Computer Data Sheet:

1. CRUISE. A number assigned to each cruise for identification purposes.
2. SAMPLE. A consecutive number applied to each core taken successively throughout the cruise.
3. LATITUDE. Expressed in degrees, minutes, and tenths of minutes.
4. LONGITUDE. Expressed in degrees, minutes, and tenths of minutes.
5. TAKEN. Date in month, day, and year that core was taken.
6. CORER TYPE. Number corresponding to sampling device code below.

1. Hydroplastic piston	6. Orange Peel
2. Hydroplastic gravity	7. Ewing
3. Kullenberg piston	8. Vibrocorer
4. Kullenberg gravity	9. Dredge
5. Phleger gravity	0. Other
7. LENGTH. Length of core recorded in centimeters as observed in the laboratory.
8. PENETRATION. Penetration of coring device recorded in centimeters as observed in the field.
9. DEPTH. The uncorrected sonic sounding recorded in meters.
10. ANALYZED. Date in month, day, and year that core was analyzed in the laboratory.
11. ID. NO.. Three digit laboratory project number followed by consecutive number assigned to each subsample analyzed.
12. INTERVAL. Interval of subsample as measured in centimeters from the top of the core.

13. MM. Particle diameter size intervals based on Wentworth size grades in millimeters.

14. PER. Percent of total sample weight within the given size interval.

15. GRAVEL, SAND, SILT, CLAY. Percent of total sample weight within the four size classes.

Class ranges are:  
 Gravel - coarser than 2 mm  
 Sand - 2 to 0.0625 mm  
 Silt - 0.0625 to 0.0039 mm  
 Clay - finer than 0.0039 mm

16. MEAN (MM). The geometric mean of the distribution expressed in millimeters.

17. MEAN (PHI). The logarithmic mean of the distribution expressed in phi units (-log<sub>2</sub> of the diameter in millimeters).

18. STAN DEV. Standard deviation. A measure of the degree of spread or dispersion of the distribution about the mean expressed in phi units.

$$\sigma = \sqrt{\sum f (X_i - \bar{X})^2 / 100}$$

19. SKEWNESS. A measure of the asymmetry of the distribution. Positive values denote skewness of the distribution toward the fine particles, negative values denote skewness toward the coarse particles. A normal distribution has a skewness of 0.

$$\alpha_3 = \frac{1}{100} \sigma^{-3} \sum f (X_i - \bar{X})^3$$

20. KURTOSIS. A measure of the peakedness of the distribution. Positive values denote a "leptokurtic" distribution, or a distribution more "peaked" than normal. Negative values denote a "platykurtic" distribution, or a distribution more "flat" than normal. A normal curve has a kurtosis of 0.

$$\alpha_4 = \frac{1}{100} \sigma^{-4} \sum f (X_i - \bar{X})^4 - 3$$

21. CACO<sub>3</sub>. Percent calcium carbonate of the total sample weight as determined by the insoluble residue method.

22. ORG CARBON. Percent organic carbon of the total sample weight as determined by the Allison method.

23. COLOR. Wet sediment color, based on the Geological Society of America Rock-Color Chart, as determined in the laboratory.
24. DOM MINERAL. Dominant mineral (s) comprising the sample assemblage.
25. SEC MINERAL. Secondary mineral (s) comprising the sample assemblage.

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The results of the sediment size and composition analyses are printed out in tabular form.

The following is an explanation of the terms encountered on the data printout sheet:

<u>CRUISE</u>	A number assigned to each cruise for identification purposes.	
<u>SAMPLE</u>	A consecutive number applied to each core taken successively throughout the cruise.	
<u>LATITUDE</u>	Expressed in degrees, minutes, and tenths of minutes.	
<u>LONGITUDE</u>	Expressed in degrees, minutes and tenths of minutes.	
<u>TAKEN</u>	Date in day, month, and year that core was taken.	
<u>CORER TYPE</u>	Letters corresponding to sampling device code below.	
	<u>Corers</u>	<u>Grabs</u>
HYP	Hydroplastic piston	SPK Shipek Sediment Sampler
HYG	Hydroplastic gravity	HLF Alpine Heavy Duty Grab
KUP	Kullenberg piston	SMS Small Mud Snapper
KUG	Kullenberg gravity	VVS Van Veen Grab
PHL	Phlegar gravity	BED Birge-Ekman Dredge
MEG	Modified Ewing gravity	DLS Dietz-LaFond Snapper
MEP	Modified Ewing piston	OPG Orange Peel Grab
VIB	Vibrocorer	SBS Scoopfish Bottom Sampler
BOM	Boomerang	DOC Diver Operated Corer
EWP	Ewing piston	
EWG	Ewing gravity	
<u>LENGTH</u>	Length of core recorded in centimeters as observed in the laboratory.	
<u>PENETRATION</u>	Penetration of coring device recorded in centimeters as observed in the field.	
<u>DEPTH</u>	The uncorrected sonic sounding in meters.	
<u>ANALYZED</u>	Date in day, month, and year that core was analyzed in the laboratory.	
<u>I.D. No.</u>	Three or four digit laboratory project number followed by consecutive number assigned to each subsample analyzed.	
<u>INTERVAL</u>	Interval of subsample as measured in centimeters from the top of the core.	
<u>MM</u>	Particle diameter size intervals based on Wentworth size grades in millimeters.	
<u>PER</u>	Percent of total sample weight within the given size interval.	

GRAVEL, SAND  
SILT, CLAY

Percent of the total sample weight within the four size classes.

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Class ranges are:

1. Gravel - coarser than 2 mm
2. Sand - 2 to 0.0625 mm
3. Silt - 0.0625 to 0.0039 mm
4. Clay - finer than 0.0039

MEAN (MM)

The geometric mean of the distribution expressed in millimeters.

MEAN (PHI)

The logarithmic mean of the distribution expressed in phi units ( $-\log_2$ ) of the diameter in millimeters.

STAN DEV

Standard deviation. A measure of the degree of spread or dispersion of the distribution about the mean expressed in phi units.

$$s = \sqrt{\frac{\sum f (x_i - \bar{x})^2}{100}}$$

SKEWNESS

A measure of the asymmetry of the distribution. Positive values denote skewness of the distribution toward the fine particles; negative values denote skewness toward the coarse particles. A normal distribution has a skewness of 0.

$$\text{Skewness} = \frac{2 \sum f (x_i - \bar{x})^3}{100 s^3}$$

KURTOSIS

A measure of the peakedness of the distribution. Positive values denote a "leptokurtic" distribution more "peaked" than normal. Negative values denote a "platykurtic" distribution, or a distribution more "flat" than normal. When using the following formula, a normal curve has a kurtosis of 0.

$$\text{Kurtosis} = \left[ \frac{\sum f (x_i - \bar{x})^4}{100 s^4} \right] - 3$$

CACO<sub>3</sub>

Percent of the total sample weight soluble in 2 N HCl.

ORG CARBON

Percent organic carbon of the total sample weight as determined using a Leco carbon analyzer.

COLOR

Wet sediment color, based on the Geological Society of America Rock-Color Chart, as determined in the laboratory.

NITROGEN

Percent nitrogen of the total sample weight as determined by the Kjeldahl method.

Project No: 465  
Location: New Orleans La.

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082-90

Logged By J.C. Bowman  
Date Logged 11 MAR 74

	La. No.	Color	Calc. Mat.	Sediment Type	Remarks
Sample No: No - 1 Lat: 29° 57.3' N Long: 90° 1.7' W Date: JUN 73 Water depth:	465- 1	Dark olive gray 543/2	No	Silty Clay	0"-12" (0-30cm)
Sample No: Lat: Long: Date: Water depth:	465- 2	Olive gray 544/2	No	Silty Clay	12"-38" (30-97cm)
Sample No: Lat: Long: Date: Water depth:	465- 3	Dark gray 544/2	No	Silty Clay	38"-64" (97-163cm) Sewage (Cinnamonia) odor.
Sample No: No - 2 Lat: 29° 57.3' N Long: 90° 1.7' W Date: JUN 73 Water depth:	465- 4	Brownish gray	No	Clay	0"-12" (0-30cm)
Sample No: Lat: Long: Date: Water depth:	465- 5	Dark yellowish brown 104124/2	No	Silty Clay	12"-57" (30-145cm)
Sample No: Lat: Long: Date: Water depth:	465- 6	Very dark gray 543/1	No	Silty Clay	57"-102" (145-295cm)
Sample No: Lat: Long: Date: Water depth:					
Sample No: Lat: Long: Date: Water depth:					
Sample No: Lat: Long: Date: Water depth:					

465

MCG 09 005-054 lot 29° 57.30 N  
082-90 long 090 1.70 W SHEET

## Chemical Analysis Summary - Lab Item 465

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## SEDIMENT SIZE AND COMPOSITION DATA

CRUISE NEWORL SAMPLE NO-1	TAKEN 25FEB74 DEPTH .0	LATITUDE 29 57.30 N LONGITUDE 90 1.70 W	MARDSEN SQUARE 482-70 CORER TYPE DOC	LENGTH 163.0 PENETRATION .0	ANALYZED	OMAY74
SUBSAMPLE ID. DEPTH INTERVAL	465 1 .0- 30.0	465 2 30.0- 97.0	465 3 97.0-163.0			
DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
< -4	>16.000	*0.000	*0.000	*0.000	*0.000	*0.000
-4 70 -3	16.000 TO 8.000	*0.000	*0.000	*0.000	*0.000	*0.000
-3 70 -2	8.000 TO 4.000	*0.000	*0.000	*0.000	*0.000	*0.000
-2 70 -1	4.000 TO 2.000	*0.000	*0.000	*1.60	*3.26	
-1 70 0	2.000 TO 1.000	*0.018	*0.031	*0.031	*1.51	
0 70 1	1.000 TO *500	*0.103	*0.031	*0.031	*1.11	
1 70 2	*500 TO *250	*0.230	*1.24	*1.24	*2.34	
2 70 3	*250 TO *125	24.536	23.778	23.778	3.083	
3 70 4	*125 TO *063	50.791	28.505	28.505	20.691	
4 70 5	*063 TO *031	10.867	12.055	12.055	12.681	
5 70 6	*031 TO *016	3.900	10.324	10.324	15.176	
6 70 7	*016 TO *008	1.471	5.432	5.432	8.534	
7 70 8	*008 TO *004	*620	3.949	3.949	4.958	
8 70 9	*004 TO .002	.745	1.731	1.731	3.258	
9 70 10	*002 TO .001	.425	.166	.166	1.828	
>10	<.001	6.293	13.714	13.714	28.970	
GRAVEL (>2.0 MM)		*0.000	*1.60	*1.60	*326	
SAND (12.0-.063 MM)	75.677	52.470	24.269			
SILT (.063-.004 MM)	16.859	31.760	41.350			
CLAY (<.004 MM)	7.463	15.610	34.055			
MEAN (MM)	*0623	*0323	*0101			
MEAN (PHI)	*4.005	4.954	6.624			
STANDARD DEVIATION	1.983	2.654	2.891			
SKEWNESS	1.172	*541	*099			
KURTOSIS	4.909	-.008	-1.286			
CALCIUM CARBONATE	7.000	8.000	10.000			
ORGANIC CARBON	*196	*292	*603			
NITROGEN (KJELDAHL)	*021	*051	*055			
COLOR (GSA)	SY3/2	SY4/1	SY4/1			

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## SEDIMENT SIZE AND COMPOSITION DATA

CRUISE NEWORL SAMPLE NO-2	TAKEN 25FEB74 DEPTH .0	LATITUDE 29 57.30 N		MARSDEN SQUARE 082-90 LONGITUDE 90 1.70 W		CORE TYPE DOC	LENGTH 295.0 PENETRATION .0	ANALYZED .0	UNAY74 .0
		SUBSAMPLE ID. DEPTH INTERVAL	465 4 .0-.30.0	465 5 .30.0-145.0	465 6 145.0-295.0				
	DIAM (MM)	PERCENT	PERCENT	PERCENT	PERCENT				
	< -4	>16.000	.000	.000	.000				
	-4 10 -3	16.000 TO 8.000	.000	.000	.000				
	-3 10 -2	8.000 TO 4.000	.000	.000	.000				
	-2 10 -1	4.000 TO 2.000	.529	.072	.267				
	-1 10 0	2.000 TO 1.000	.215	.082	.030				
	0 10 1	1.000 TO .500	.572	.099	.033				
	1 10 2	.500 TO .250	.845	.133	.095				
	2 10 3	.250 TO .125	4.881	.12.209	6.713				
	3 10 4	.125 TO .063	23.760	.38.273	24.751				
	4 10 5	.063 TO .031	9.475	14.487	8.005				
	5 10 6	.031 TO .016	11.395	9.700	10.498				
	6 10 7	.016 TO .008	6.101	3.796	3.935				
	7 10 8	.008 TO .004	3.356	2.425	2.118				
	8 10 9	.004 TO .002	2.046	1.750	1.637				
	9 10 10	.002 TO .001	1.866	3.226	.466				
	>10	<.001	34.957	13.749	41.452				
	GRAVEL (>2.0 MM)		*52%	*.072	*.267				
	SAND (.2.0-.063 MM)		30.274	50.796	31.622				
	SILT (.063-.004 MM)		30.328	30.407	24.556				
	CLAY (<.004 MM)		38.869	18.725	43.555				
	MEAN (MM)		*0.097	*0.280	*.0083				
	MEAN (PHI)		6.683	5.159	6.920				
	STANDARD DEVIATION		3.181	2.649	3.245				
	SKEWNESS		*0.021	*5.39	*0.01				
	KURTOSIS		-1.424	-.188	-1.677				
	CALCIUM CARBONATE		12.000	15.000	9.000				
	ORGANIC CARBON		*425	*373	*487				
	NITROGEN (KJELDAHL)		*086	*056	*069				
	COLOR (GSA)		SYR4/1	10YR4/2	5Y3/1				

**CORE ANALYSIS SUMMARY SHEET**  
**ENGINEERING PROPERTIES**

465

ANALYZED BY Ross, Kelly, Draper  
 DATE July 1973

082-90

1. CRUISE NO.	2. LATITUDE	3. LONGITUDE	4. SAMPLE NO.	5. DATE TAKEN (Day, month, year)	6. WATER DEPTH (m)	7. TYPE CORER	8. CORE LENGTH (cm)	9. CORER PENETRATION (cm)
New Orleans	29° 57' 30"	W						
WET UNIT WEIGHT (g/cm³)			1.91	1.82	1.87			
SPECIFIC GRAVITY OF SOLIDS			2.63	2.64	2.64			
WATER CONTENT (% dry weight)			30.11	38.31	34.21			
VOID RATIO			0.792	1.012	0.902			
SATURATED VOID RATIO			0.792	1.012	0.902			
POROSITY (%)			44.2	50.3	47.3			
LIQUID LIMIT								
PLASTIC LIMIT								
PLASTICITY INDEX								
LIQUIDITY INDEX								
COMPRESSION INDEX FROM LL								
COMPRESSIVE STRENGTH NATURAL			(g/cm²)					
REMOULD			(g/cm²)					
COHESION NATURAL			(g/cm²)					
REMOULD			(g/cm²)					
SENSITIVITY								
ANGLE OF INTERNAL FRICTION (°)								
ACTIVITY								
MODULUS OF ELASTICITY								
SLUMP (%)								
REMARKS	Wet Unit Weight, Void Ratio, Saturated Void Ratio, and Porosity are calculated at 100% saturation.							

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## CORE ANALYSIS SUMMARY SHEET ENGINEERING PROPERTIES

PRNC-NAVOCEANO-3167/18 B (4-63)

ANALYZED BY Ross, Kelly, Draper  
DATE July 1973

465

087-90

1. CRUISE NO. New Orleans	4. SAMPLE NO. Core No. 2	7. TYPE CORER
2. LATITUDE $29^{\circ} 57' 30'' N$	5. DATE TAKEN (Day, month, year)	8. CORE LENGTH (cm) 295
3. LONGITUDE $90^{\circ} 1' 20'' W$	6. WATER DEPTH (m)	9. CORER PENETRATION (cm)
10. SUBSAMPLE DEPTH IN CORE (cm)	Sample No. 1	Sample No. 2
11. WET UNIT WEIGHT ( $\text{g/cm}^3$ )	1.53	1.89
12. SPECIFIC GRAVITY OF SOLIDS	2.65	2.64
13. WATER CONTENT (% dry weight)	81.14	32.30
14. VOID RATIO	2.153	0.853
15. SATURATED VOID RATIO	2.153	0.853
16. POROSITY (%)	68.3	46.0
17. LIQUID LIMIT		
18. PLASTIC LIMIT		
19. PLASTICITY INDEX		
20. LIQUIDITY INDEX		
21. COMPRESSION INDEX FROM LL		
22. COMPRESSIVE STRENGTH NATURAL ( $\text{kg/cm}^2$ ) REMOLD ( $\text{kg/cm}^2$ )		
23. COHESION NATURAL ( $\text{kg/cm}^2$ ) REMOLD ( $\text{kg/cm}^2$ )		
24. SENSITIVITY		
25. ANGLE OF INTERNAL FRICTION ( $\theta$ )		
26. ACTIVITY		
27. MODULUS OF ELASTICITY		
28. SLUMP (%)		
29. REMARKS Wet Unit Weight Ratio, Saturated Void Ratio, and Porosity are calculated assuming 100% saturation.		